



LANGLEY RESEARCH CENTER



NASA Advisory Council Commercial Space Committee
May 1, 2012

Agenda



- **Introduction to LaRC**
 - LaRC Vision and Mission Statement
 - LaRC at a Glance
 - Organization
 - Core Resources
 - Facilities
- **Current Mission Support**
- **Key Questions**



NASA LaRC's Vision and Mission



The NASA Langley Vision is:

*We are innovators enabling.....
On-Demand Air Mobility,
Access to Space for Everyone,
Understanding of Climate Change*

The Center's Mission Statement:

- *Langley is a research, science, technology and development center that provides game changing innovations to enable NASA to make significant contributions to the Nation.*
- *We are Leaders in systems innovation for expanding air mobility, exploring space, and definitively characterizing the earth's changing climate.*
- *Our work spans fundamental research to mission development and operations with an eye toward the next generation of cutting edge ideas that provide new capabilities or significantly improve performance or cost.*

NASA Langley at a Glance (2012)



Founded in 1917

1st civil aeronautical research lab

~\$831m PY2012 Budget

~\$804m NASA Langley budget

~\$ 27m External business

~3,600 Workforce

~1,900 Civil Servants

~1,700 Contractors (on/near-site)
(~250 students)

Langley's Economic Impact (2011)

National economic output of ~ \$2b and generates over 17,000 high-tech jobs

Virginia economic output of ~ \$1b and generates over 9,000 high-tech jobs

Infrastructure/Facilities

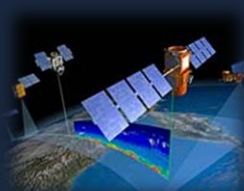
788 acres, 169 Buildings

~\$3.3b replacement value

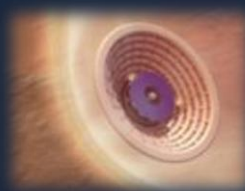
Aeronautics
44%



Science
28%



Space Tech
15%



Human Exploration
12%



Education
1%



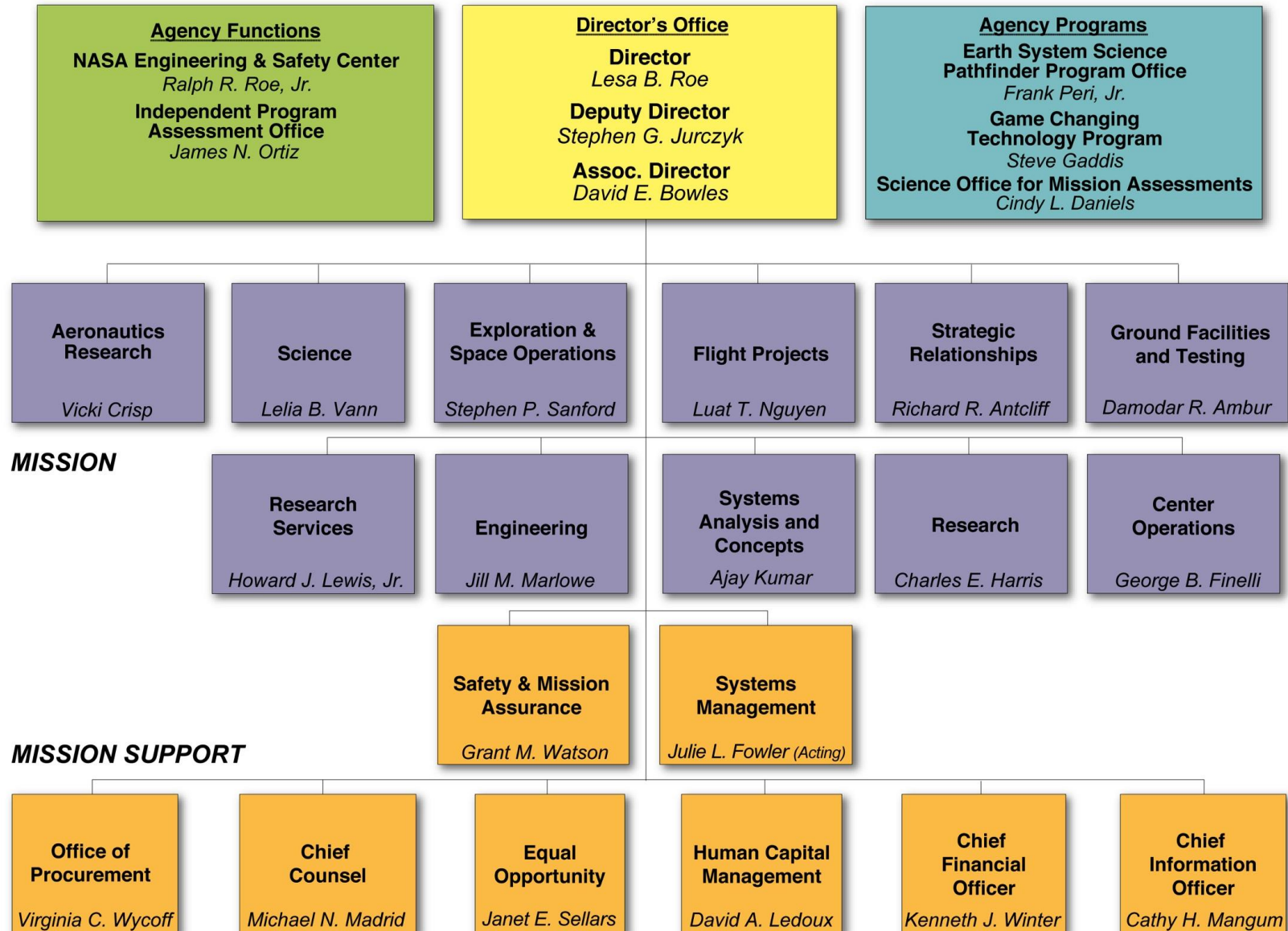
Cross-Agency Support Program & Construction/Environmental Compliance & Restoration

- Center Management & Operations

- Agency Management & Operations

- Construction/Environmental Compliance & Restoration

NASA Langley Research Center Current Organization

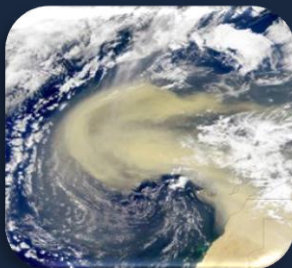


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NASA Langley Core Competencies

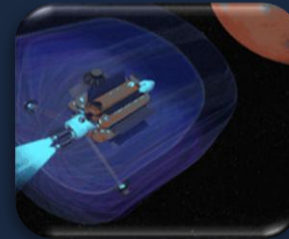


Aerosciences Research for Flight in All Atmospheres

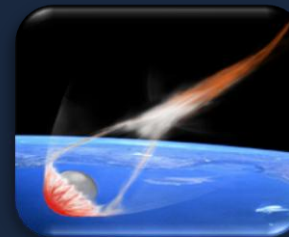


Characterization of all Atmospheres (Lasers & LIDAR)

Aerospace Systems Analysis



Entry, Descent & Landing



Aerospace Structural & Material Concepts

NASA Langley Facilities



14 x 22 Foot Subsonic Tunnel
Subsonic, Alternate Uses



National Transonic Facility
High Reynolds Number Flow
Nationally Unique



LaRC Unitary Plan Wind Tunnel
Supersonic Speed Range



Aerothermodynamic Complex
Exploration Workhorse

Subsonic

Transonic

Supersonic

Hypersonic

National Assets required to meet the needs of the Agency, DoD, and Industry



Flight Simulation Facilities



20-Foot Vertical Spin Tunnel
Spin Characteristics & Dynamic Stability
Nationally Unique



Transonic Dynamics Tunnel
Aeroelasticity & Flutter
World Unique



8-Ft High Temperature Tunnel
Large-scale Hypersonics & Propulsion

Specialty Facilities

Human Exploration and Operations @ NASA Langley Research Center

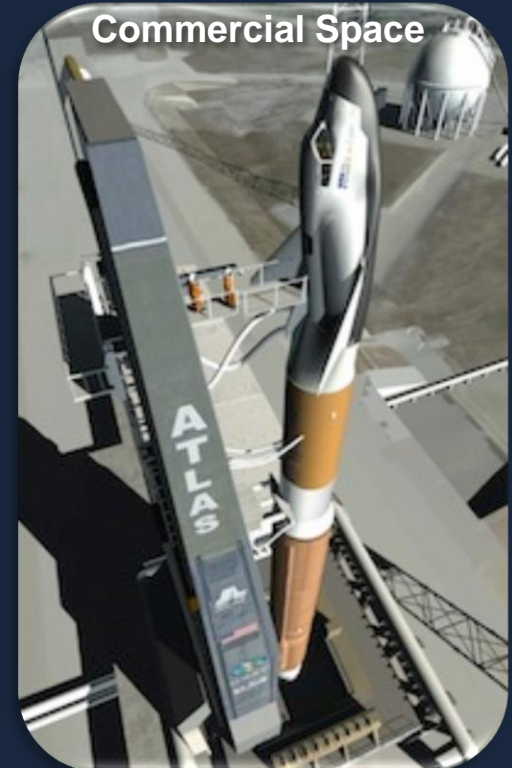


Space Launch System

- Wind Tunnel Testing
- Aerodynamics



- Launch Abort System
- Thermal Protection System
- Test Article Splash Testing
- Guidance Navigation & Control



Commercial Space

- Commercial Crew
- Commercial Cargo



Advanced Exploration Systems

- Composites
- Extravehicular Activity
- Habitat Demonstration Unit
- Multi-Mission Space Exploration Vehicle
- Radiation Protection

Space Technology Development @ NASA Langley Research Center



Lightweight Materials & Structures

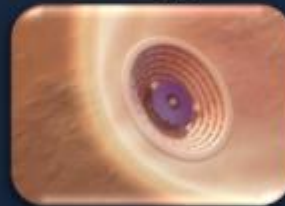


Inflatable Structures
Advancement Research



Ultra-Large Solar
Array Structures

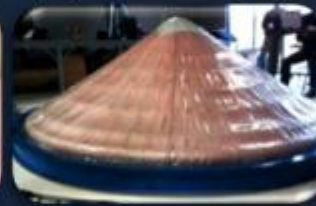
Entry, Descent & Landing Systems



HIAD (Hypersonic Inflatable Aerodynamic Decelerators)

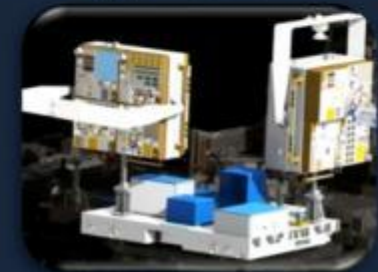


ALHAT
(Autonomous Landing / Hazard
Avoidance Technology)



MEDLI
(MSL Descent
Landing Instrumentation)

ISS Applications



MISSE-X
(Materials International
Space Station Experiment-X)

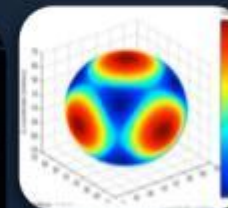
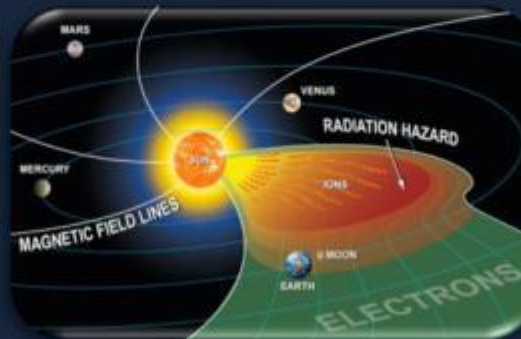
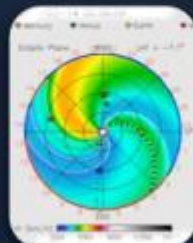
Radiation Protection



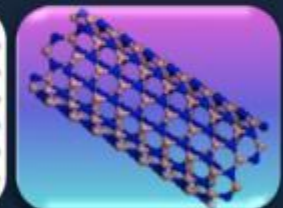
Monte Carlo
Radiation Analysis



Integrated Solar Energetic
Proton Event Alert/
Warning System



Electrostatic
Gossamer
Structures for
Radiation Shielding



BNNT (Boron Nitride
Nanotube) Materials
for Radiation
Shielding

Commercial Space Support

@ NASA Langley Research Center



Commercial Crew and Cargo Office (NASA)

- Loads Analysis
- Blackout Analysis
- Imaging (SCIFLI)



Commercial Crew Program (NASA)

- Technical Oversight / Review
 - Aero
 - EDL
 - Landing Systems
 - Launch Abort Systems
 - GN&C



Sierra Nevada Corporation (Dream Chaser)

- Aero
- Aerothermal
- Wind Tunnel Testing
- GN&C



SpaceX (Dragon)

- Abort Loads Analysis
- Wind Tunnel Testing

New Business Pursuits...

- CCiCap (SNC / Draper)
- Mid-Atlantic Regional Spaceport (VA)
- Wallops Space Flight Center
- DoD / International Programs

Key Questions



- 1. How is the Agency's commercial space strategy message being perceived at the Center?**
- 2. What is the Center doing to promote it?**
- 3. What are the Center's plans for transitioning from the Shuttle and Constellation programs to the new Agency direction that includes commercial space, and how are those plans progressing?**
- 4. How is the Center addressing excess capacity issues?**
- 5. Do you have any concerns or issues with transitioning to the Agency's commercial space strategy?**

Key Questions



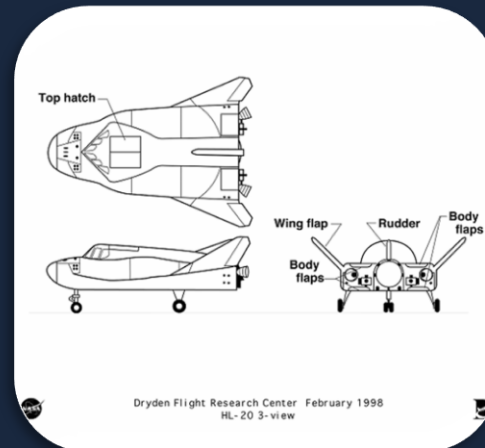
1. How is the Agency's commercial space strategy message being perceived at the Center?

LaRC has embraced the Commercial Space Strategy and strives to support this new initiative!

- The paradigm has shifted from an “operational” mode back to research and development...



Operational

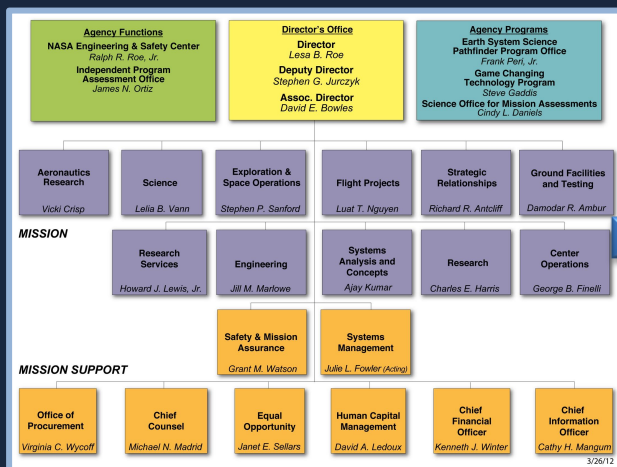


R & D

Key Questions

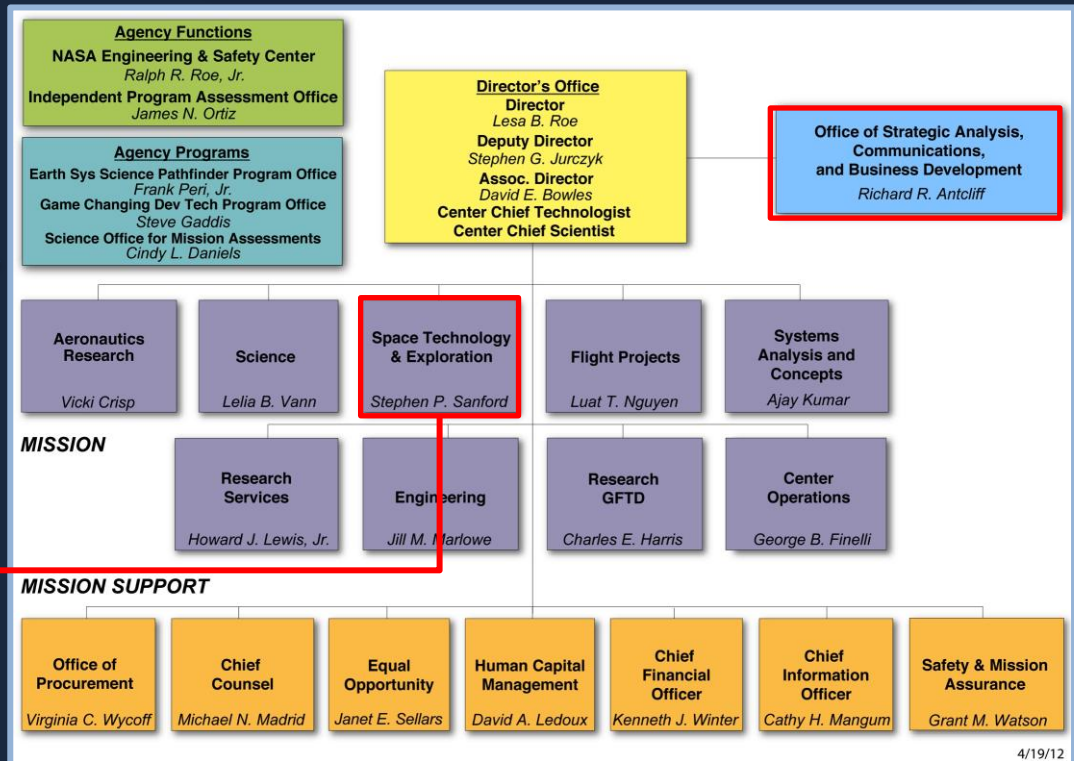
2. What is the Center doing to promote it?

LaRC is actively changing to support new space missions and commercial space customers.



Current Organization

Commercial Space Projects Office

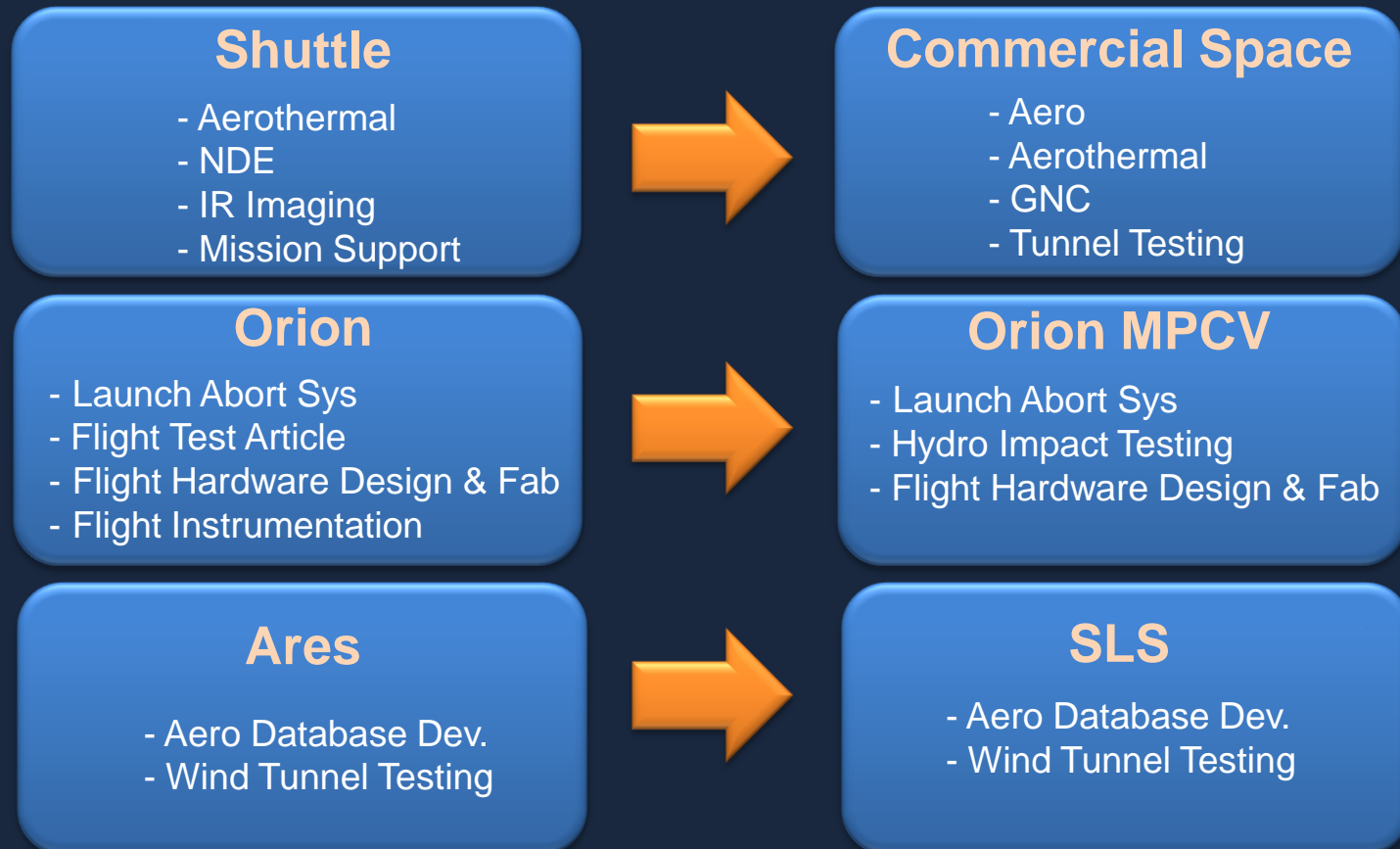


Proposed Organization

Key Questions



3. What are the Center's plans for transitioning from the Shuttle and Constellation programs to the new Agency direction that includes commercial space, and how are those plans progressing?



Key Questions



4. How is the Center addressing excess capacity issues?

Workforce has transitioned from Shuttle / Constellation to Commercial Space / SLS / Orion MPCV / Space Technology with no excess capacity issues.

NASA Langley at a Glance (2010)



Founded in 1917
1st civil aeronautical research lab

~\$762m Budget
~\$662m NASA Langley budget
~\$100m External business & 2009 Recovery Act

~3,700 Workforce
~1,900 Civil Servants
~1,800 Contractors (on/near-site)
(~260 students)

Langley's Economic Impact (2009)
National economic output of \$2b and generates 16,490 high-tech jobs
Virginia economic output of \$920m and generates 8,138 high-tech jobs

Infrastructure/Facilities
788 acres, 205 Buildings
~\$3.3b replacement value

Aeronautics 50% **Science** 24% **Exploration** 22% **Space Operations** 1% **Education** 3%



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Cross-Agency Support Program & Construction/Environmental Compliance & Restoration
- Center Management & Operations - Agency Management & Operations - Construction/Environmental Compliance & Restoration

5. Do you have any concerns or issues with transitioning to the Agency's commercial space strategy?

- a. Commercial Space Companies need a stable NASA budget to maintain development schedules.**
- b. Approval process for Space Act Agreements needs to be stream-lined to meet Commercial Space companies schedules.**
- c. Unitary Plan Wind Tunnel to be mothballed in July 2012.**